

## NEW RECORDS OF POLYCLAD FLATWORMS (PLATYHELMINTHES: TURBELLARIA) FROM CORAL REEFS OF LAKSHADWEEP ISLAND, INDIA

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Ten new records of polyclad flatworms, which include five species of *Pseudoceros* Lang, 1884, four species of *Pseudobiceros* Faubel, 1984 and one species of genus *Maritigrella*, recorded from Lakshadweep Island, India, are described. One species of genus *Thysanozoon* Grube, 1840 is also recorded.

**Keywords:** Polyclad, *Pseudoceros*, *Pseudobiceros*, *Maritigrella*, *Thysanozoon*, Lakshadweep, India

### INTRODUCTION

Polyclads are prominent among the fauna of coral reefs from tropical and sub-tropical waters (Bolaños *et al.* 2007). Other than coral reefs, polyclads often inhabit rocky intertidal crevices, in association with other invertebrates (Quiroga *et al.* 2004). Although conspicuous, data available on taxonomy and geographical distribution of polyclads is scanty, and mostly concentrated to a particular region.

The earlier works on polyclad worms are by Lang (1884), Woodworth (1898), Haswell (1907), Yeri and Kaburaki (1918), Kaburaki (1923a, b) and Bresslau (1933). Marcus (1950), Hyman (1939, 1954a,b, 1955, 1959) and Prudhoe (1985, 1989) also have important contributions in polyclad taxonomy. Faubel (1983, 1984) used the reproductive anatomy to classify polyclads. The most intensive work on polyclad diversity, from the Indo-Pacific region, was by (Newman and Cannon (1994, 1995, 1996a,b, 1997, 1998, 2000), Newman and Anderson (1997), Newman and Peter (2002), Newman *et al.* (2003). Some literature is also available from the Persian Gulf (Zahra *et al.* 2009).

In India, studies on polyclads have remained neglected; little is known about their diversity on the east and west coasts. Laidlaw (1902) studied six species of *Pseudoceros* and one species of *Thysanozoon* from the Maldives and Laccadive archipelagos. This paper describes ten species of polyclads of Family Pseudocerotidae Lang 1884 and one species of Euryleptidae Lang 1884, from Lakshadweep Island, India. All the species are new to the Indian coast, except *Thysanozoon* of Family Pseudocerotidae (Laidlaw 1902).

### STUDY AREA

Field collections were conducted on Kavratti island, Lakshadweep, west coast of India, from December 2008 to March 2009, on the eastern reef and shallow lagoon west of

the island. The habitat on the eastern reef is dominantly coral boulders and loose rocks, while the lagoon is dominated by a coral reef. Direct search method was used; specimens were hand collected, during low tides in the intertidal region by overturning rocks, besides snorkeling in shallow waters. Geographical details were taken at collection sites and a position has been mapped with the Google Earth images. Live specimens were photographed *in situ* to record the true colours. Description of the colour patterns is based on live specimens. Identification is purely on the basis of external morphology and colour patterns with the aid of above mentioned literature and online databases (Discover Life; Authour-Wolfgang Seifurth (1997); Newman and Cannon (2003)).

### Descriptions

#### Family: Pseudocerotidae

##### *Pseudoceros goslineri* Newman & Cannon, 1994

**Description:** Body is elongated and oval with a few marginal ruffles. Pseudotentacles are simple tubular folds of anterior margin. Dorsal surface is creamish with orange, pink and brick-red dots, spread unevenly. Reddish spots clustered together, appear as irregular blotches near the anterior extremity and just behind the cerebral eyespot. Dorsal margin has pinkish-purple irregular spots, which are closer across the pseudotentacles.

**Size:** 20 mm.

**Extralimital Distribution:** Indo-Pacific.

##### *Pseudoceros indicus* Newman & Schupp, 2002

**Description:** Body is elongated with a few marginal ruffles. Pseudotentacles are simple and erected. Dorsal surface is opaque, white to creamish with ink blue or purple well-defined spots along the margin. These spots are irregular in shape, well spaced-out and continue over the pseudotentacles. The mid-dorsal area has a pink tinge in some specimens. The species shows a wide range of colour variation.



Fig 1. Map of Kavaratti Island indicating the collection sites

Size: 20 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudoceros parataticlavus* Newman & Cannon, 1994

**Description:** Body is elongated with well-defined marginal ruffles and simple pseudotentacles. Dorsal surface is black, with a wide median greyish band whereas margin shows two distinct bands, inner white and outer bright yellow. Pseudotentacles are black with a yellow margin.

Size: 40 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudoceros prudhoei* Newman & Cannon, 1994

**Description:** Body is elongated with shallow marginal ruffling and simple pseudotentacles. Dorsal surface is deep brown to black with two marginal bands; the inner band is blue and outer yellow.

Size: 30 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudoceros cf susanae* Newman & Anderson, 1997

**Description:** Body is elongated with a few marginal ruffling. Pseudotentacles are simple, pointed and erect; they are blue with a dark purple rim. Dorsal surface is bright orange with a white stripe at the mid-dorsal region and margin shows a white band at the centre followed with a dark purple band.

Size: 60 mm.

**Extralimital distribution:** Indian Ocean.

*Pseudobiceros gratus* Kato, 1937

**Description:** Body is elongated with deep marginal ruffles. Pseudotentacles are erect, pointed and ear-like. Dorsal surface is white with parallel black stripes. Mid-lateral stripes meet at both extremities. Lateral stripes do not extend beyond cerebral eyespot, but meet posteriorly. Body has a thin black margin, which also runs across the pseudotentacles.

Size: 40 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudobiceros murinus* Newman & Cannon, 1997

**Description:** Body is transparent, grey-green with a few marginal ruffles. Pseudotentacles are long, erect and pointed. Pseudotentacles are purple-pink with a white spot at the tip. Dorsal surface with irregular black and white dots in evenly spread scattered clusters. Median portion is raised and reddish whereas margin shows an orange band with a narrow white rim.

Size: 60 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudobiceros stellae* Newman & Cannon, 1994

**Description:** Body is elongated with deep marginal ruffles. Pseudotentacles are square and inflated. Dorsal background is black with white dots throughout. Larger dots appear like clusters and are distributed regularly.

Size: 30 mm.

**Extralimital Distribution:** Indo-Pacific.

*Pseudobiceros uniarborensis* Newman & Cannon, 1994

**Description:** Dorsal surface is dark brown to black with margin having three distinct bands – inner bright orange, middle transparent grey and outer opaque white. Pseudotentacles are pointed and black with white tips and without marginal bands.

Size: 25 mm.

**Extralimital Distribution:** Indo-Pacific.

*Thysanozoon* sp.

**Description:** Body is translucent and elongated, with a few marginal ruffling. Pseudotentacles are small. Dorsal surface

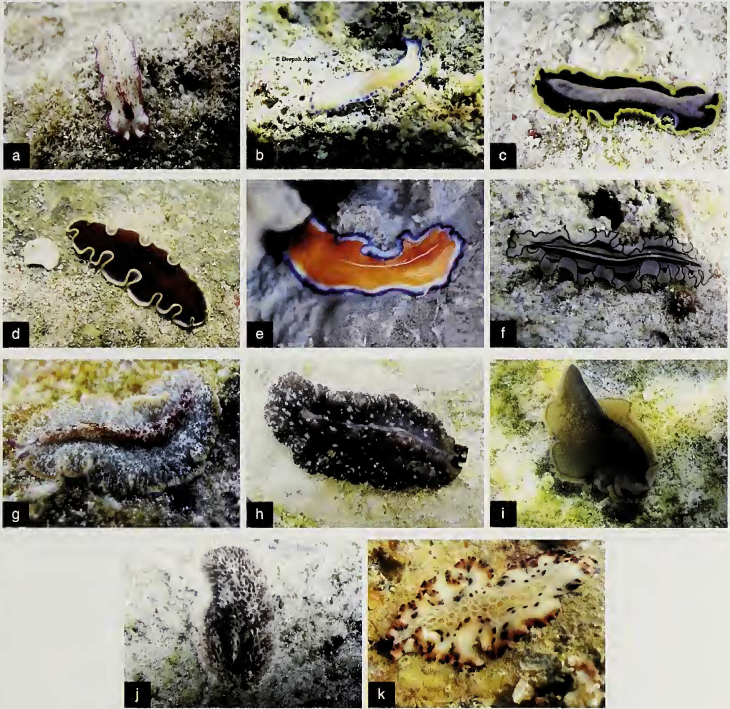


Fig. 1 (a-k): Polyclad flatworms recorded from coral reefs of Kavaratti Island, Lakshadweep Islands,

- a. *Pseudoceros goslineri*; b. *Pseudoceros indicus*; c. *Pseudoceros parataliclavus*; d. *Pseudoceros prudhoei*; e. *Pseudoceros cf. susanae*;  
 f. *Pseudobiceros gratus*; g. *Pseudobiceros murinus*; h. *Pseudobiceros stellae*; i. *Pseudobiceros uniaborensis*; j. *Thysanozoon* sp.;  
 k. *Maritigrella fuscopunctata*

shows pink-white mottling and numerous red-brown papillae.

Size: 20 mm.

Extralimital Distribution: Indo-Pacific.

**Family: Euryleptidae**

*Maritigrella fuscopunctata* Newman & Cannon, 2000

**Description:** Body is elongated with deep marginal ruffles. Marginal tentacles are pointed and erect. Dorsal

background is creamish white, with black spots in transverse rows. Black spots are surrounded by a faint violet band. The mid-dorsal portion is raised with orange spots, which are arranged in a honeycomb pattern. Margin shows orange band and small black spots extending across the tentacles.

Size: 40 mm.

Extralimital Distribution: Indo-Pacific.

## CONCLUSION

Among the eleven species of polyclads recorded in Kavaratti Island of Lakshadweep, *Pseudoceros indicus*, *P. paratalactavus*, *P. prudhoei* and *Pseudobiceros murinus* were common. *Pseudobiceros gratus* and *Maritigrella fuscopunctata* were rare. The records of these polyclad species in the Lakshadweep Islands, which have hitherto not been reported from the Indian coasts, clearly reveal the major gaps in the documentation of polyclad fauna of India. More surveys and studies need to be taken up to document the polyclad fauna of India. There will also be a need for DNA sequencing to reveal the actual diversity of this confusing group.

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## REFERENCES

- AUTHOUR-WOLFGANG SEIFURTH (1997): Marine Flatworms of the World: <http://www.tzuser.uni-heidelberg.de/~bu6/flatintr.htm>
- BRESSLAU, E. (1933): Turbellaria. Pp. 193-293, 314-319. In: Kükenthal, W. & T. Krumbach (Eds): Handbuch der Zoologie. Walterde Gruyter & Co., Berlin.
- BOLASOS, D.M., S.Y. QUIROGA & M.K. LITVAITIS (2007): Five new species of cotype flatworms (Platyhelminthes: Polycladida) from the wider Caribbean. *Zootaxa* 1650: 1-23.
- DISCOVERLIFE (2010): [http://www.discoverlife.org/mp/20q?guide=Groups\\_Platyhelminthes](http://www.discoverlife.org/mp/20q?guide=Groups_Platyhelminthes). Downloaded on 2nd Feb. 2010.
- FAUBEL, A. (1983): The Polycladida, Turbellaria. Proposal and establishment of a new system, Part I. The Acotylea. *Mitteilungen des hamburgischen zoologischen Museums und Instituts* 80: 17-121.
- FAUBEL, A. (1984): The Polycladida, Turbellaria. Proposal and establishment of a new system, Part II. The Cotylea. *Mitteilungen des hamburgischen zoologischen Museums und Instituts* 81: 189-259.
- HASWELL, W.A. (1907): Observations on Australian Polyclads. *Transactions of the Linnean Society, London* (2), Zoology 9: 465-485.
- HYMAN, L.H. (1939): Some polyclad of the New England Coast, especially of the Woods Hole region. *Biological Bulletin LXXVI*(2): 127-152.
- HYMAN, L.H. (1954a): The polyclad genus *Pseudoceros*, with special reference to the Indo-Pacific region. *Pacific Science* 8: 219-225.
- HYMAN, L.H. (1954b): Some polyclad from the Hawaiian Island. *Pacific Science* 8: 331-336.
- HYMAN, L.H. (1955): Some polyclad from Polynesia and Micronesia. *Proceedings of the U.S. National Museum* 105: 65-82.
- HYMAN, L.H. (1959): A further study of Micronesian polyclad flatworms. *Proceedings of the U.S. National Museum* 108: 543-597.
- KABURAKI, T. (1923a): The polyclad turbellarians from the Philippine Islands. Bulletin of the United States National Museum. *Washington Bulletin 100*(Vol. 1 part 10): 635-649.
- KABURAKI, T. (1923b): Notes on Japanese Polyclad Turbellarians. *Annotations Zoologicae Japonenses* 10: 192-201.
- LAIDLAW, F.F. (1902): The marine Turbellaria, with an account of the anatomy of some species. Fauna and Geology of the Maldives and Laccadive Archipelagoes 1: 282-312.
- LANG, A. (1884): Die Polycladen des Golfes von Neapel und der angrenzenden Meeresabschnitte. Eine Monographie. *Fauna Flora des Golfes V. Neapel, Leipzig* 11: 1-688.
- MARCUS, E.R. (1950): Turbellario brasiliensis (8). *Boletins da Faculdade de Filosofia, Ciências e Letras, Universidade de São Paulo* 15: 5-191.
- NEWMAN, L.J. & L.R.G. CANNON (1994): *Pseudoceros* and *Pseudobiceros* (Polycladida: Pseudocerotidae) from Eastern Australia and Papua New Guinea. *Memoirs of the Queensland Museum* 37: 205-266.
- NEWMAN, L.J. & L.R.G. CANNON (1995): Color pattern variation in tropical flatworm, *Pseudoceros* (Platyhelminthes: Polycladida) with description of three new species. *The Raffles Bulletin of Zoology* 43: 435-446.
- NEWMAN, L.J. & L.R.G. CANNON (1996a): New genera of Pseudocerotid flatworms (Platyhelminthes: Polycladida) from Australian and Papua New Guinean coral reefs. *Journal of Natural History* 30: 1425-1441.
- NEWMAN, L.J. & L.R.G. CANNON (1996b): *Bulaceros*, new genus and *Tyrtosoceros*, new genus (Platyhelminthes: Polycladida: Pseudocerotidae) from the Great Barrier Reef, Australia and eastern Papua New Guinea. *The Raffles Bulletin of Zoology* 44: 479-492.
- NEWMAN, L.J. & C. ANDERSON (1997): A new polyclad flatworm from the Maldives. *Journal of South Asian Natural History* 2: 237-245.
- NEWMAN, L.J. & L.R.G. CANNON (1997): Nine new *Pseudobiceros* (Platyhelminthes: Polycladida: Pseudocerotidae) from the Indo-Pacific. *The Raffles Bulletin of Zoology* 45: 341-368.
- NEWMAN, L.J. & L.R.G. CANNON (1998): *Pseudoceros* (Platyhelminthes: Polycladida) from the Indo-Pacific with twelve new species from Australian and Papua New Guinea. *The Raffles Bulletin of Zoology* 46(2): 293-323.
- NEWMAN, L.J. & L.R.G. CANNON (2000): A new genus of Euryleptid flatworm (Platyhelminthes: Polycladida: Euryleptidae) from the Indo-Pacific. *Journal of Natural History* 34: 191-205.
- NEWMAN, L.J. & L.R.G. CANNON (2003): Marine flatworms: The world of polyclads, Australia. CSIRO Publishing. 97 pp.
- NEWMAN, L.J. & S. PETER (2002): A new species of pseudocerotid flatworm (Platyhelminthes: Polycladida) from the Indo-Pacific. *Micronesica* 34(2): 177-184.
- NEWMAN, L.J., G. PAULAY & R. RITSON-WILLIAMS (2003): Checklist of Polyclad flatworms (Platyhelminthes) from Micronesian coral reefs. *Micronesica* 35-36: 189-199.

NEW RECORDS OF POLYCLAD FLATWORMS OF LAKSHADWEEP ISLAND

- PRUDHOE, S. (1985): A Monograph on Polyclad Turbellaria. Oxford University Press, Oxford. 259 pp.
- PRUDHOE, S. (1989): Polyclad turbellarians recorded from African waters. *Bulletin of the British Museum of Natural History* 55: 47-96.
- QUIROGA, S., M. BOLAÑOS & M. LITVAITIS (2004): Polyclads (Platyhelminthes: "Turbellaria" from the tropical Western Atlantic). *Biota colombiana* 5(2): 159-172.
- WOODWORTH, W. MCM. (1898): Some planarians from the Great Barrier Reef of Australia. *Bulletin of the Museum of Comparative Zoology, Harvard* 31: 63-67.
- YERI, M. & T. KABURAKI (1918): Description of some Japanese Polyclad Turbellaria. *Journal of Cell Science University Tokyo* 39(9): 1-54.
- ZAHRA, K., R. HASSAN & P. JAMILE (2009): First record of the family Pseudocerotidae (Platyhelminthes: Polycladida: Cotylea) from the Persian Gulf, Iran. *Zoo Keys* 31: 39-51.

